ALUMINUM

Project Fact Sheet

Detection and Removal of Molten Salts from Molten Aluminum Alloys

Benefits

- improved metal casting quality, recovery, and reliability
- elimination of melt rejection and recast due to salt contamination, with a potential annual energy savings of 40 billion British thermal units (Btu)
- estimated reduction in chlorine use and release of about 71,000 cubic feet per year

Applications

The implementation of this technology will improve the metal quality of the aluminum casting industry through the detection and removal of impurities and inclusions from molten aluminum.

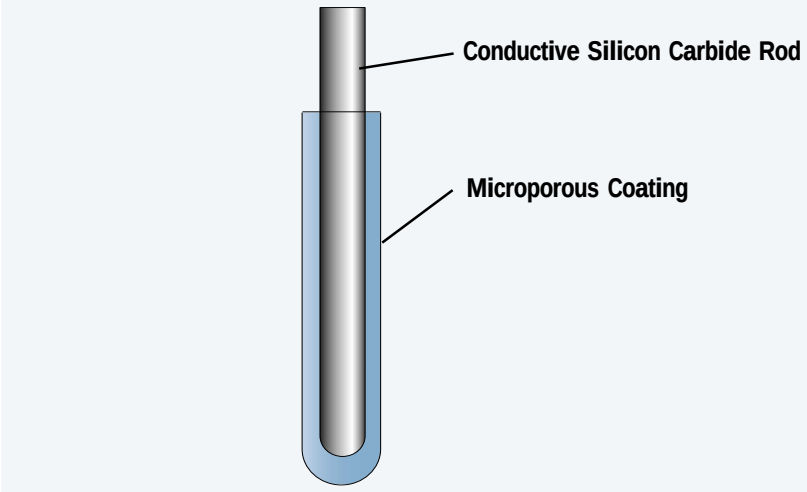
New probe and filter will improve metal quality through detection and removal of impurities

Commercialization has begun on a new probe and filter technology to detect and reduce chloride salts in molten aluminum. These salts have been shown to initiate defects when they agglomerate and migrate to the surface of an ingot or a casting. The salts are liquid at aluminum casting temperatures and pass through conventional filter systems that are designed to capture solid inclusions. Moreover, the salts tend to reduce the efficiency of conventional filters by causing the release of solid inclusions.

Project partners have developed a simple electrical probe that detects the presence of salts in molten aluminum. This probe is used with a filter that selectively removes liquid salts from liquid metal. Together, the probe and filter ensure better quality casting. The efficiency and capacity of the probe and filter have been demonstrated under commercial casting conditions. Demonstration trials are continuing at commercial plant sites. In addition, Selee Corporation is developing a more robust and portable version of the data acquisition system for the salt probes and has manufactured additional probes.

This project addressed research needs identified in the *Aluminum Industry Technology Roadmap*. These needs include improved metal quality, increased reliability of manufacturer operations up to 95 percent, and real-time measurement of molten metal composition.

Salt Probe



Microporous coated electrical probe.

Project Description

Goals: The goal of this project was to develop a new probe and filter technology for detecting and removing molten salts from aluminum alloys. This goal has been met. Project partners recently began commercializing the filter and sensor probe technology.

Progress and Milestones

Completed Tasks

- Completed the first and second set of experimental trials of the filter and sensor probe at the Alcoa Technical Center by the Summer of 1999.
- Exposed the sensor probe and the filter to various levels of chlorine and metal flow rates using commercial alloys at Alcoa Technical Center's experimental casting facility.
- Analyzed melt inclusions using a Liquid Metal Cleanliness Analyzer (referred to as the LiMCA II).
- Characterized the melt using a vacuum filtration technique to provide metal cleanliness data.
- Collected and analyzed samples of the melt to provide an independent determination of the chlorine level. This way, the response of the probe was correlated with chlorine levels over a wide range of conditions.
- Assessed the efficiency of the salt filter. By monitoring the efficiency of the filter as a function of chlorine and time in casting, the adsorptive capacity of filter media was determined.
- Developed a more robust version of the data acquisition system for the salt probes.
- Manufactured additional salt probes.

On-Going Tasks

- Conducting demonstration testing of the salt probes and filter media at commercial sites.
- Fabricating extra portable data units. Engineers will carry these extra portable units with them whenever they travel to an aluminum cast shop. The units will become part of the engineers' routine trouble shooting gear.

Commercialization Plan

Selee Corporation has a clear and direct interest in implementing the technologies developed in this project. Demonstration trials of the probes and filters are being conducted at commercial plant sites. Full commercial implementation by the domestic aluminum industry will soon follow.

PROJECT PARTNERS

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